REMARKS

INTRODUCTION:

In accordance with the foregoing, claims 2, 6, 9, 11-13 and 15-16 have been canceled without prejudice or disclaimer, and claims 1, 5, 10, and 14 have been amended. No new matter is being presented, and approval and entry are respectfully requested.

Claims 1, 5, 10, and 14 are pending and under consideration. Reconsideration is respectfully requested.

CHANGE OF POWER OF ATTORNEY:

Enclosed herewith is a copy of the Power Of Attorney By Assignee And Revocation of Prior Powers and Statement And Certification Under 37 CFR 3.73(b) together with a copy of the Submission of Power of Attorney By Assignee And Revocation Of Prior Powers Transmittal Letter, which were filed on November 22, 2006.

OBJECTIONS TO CLAIMS:

A. In the Office Action, at page 2, claims 1 and 5 were objected to under 37 CFR 1.75(i) as being of improper form for failing to indent each step or element of the claims.

Claims 1 and 5 have been amended to indent each operation or element.

Therefore, the outstanding claim 1 and claim 5 objections should be resolved.

Reconsideration and withdrawal of the outstanding objections to claims 1 and 5 are respectfully requested.

B. In the Office Action, at page 2, claims 12 and 16 were objected to under 37 CFR 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Claims 12 and 16 have been canceled without prejudice or disclaimer.

Therefore, the outstanding claim 12 and claim 16 objections are now moot.

REJECTION UNDER 35 U.S.C. §112:

A. In the Office Action, at pages 2-3, claims 1-2, 5-6 and 9-16 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. This rejection is traversed and reconsideration is requested (see below).

B. In the Office Action, at pages 3-5, claims 1, 5, and 9-16 were rejected under 35 U.S.C. §112, first paragraph, because the Examiner submitted that the specification, while being enabling for the case I which the PprA protein is one having SEG ID NO: 1, does not reasonably provide enablement for the case in which the PprA protein is one having an amino acid sequence other than that of SEQ ID NO: 1. The Examiner submitted that the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the method to make the kit of the invention commensurate in scope with these claims. This rejection is traversed and reconsideration is requested (see below).

C. In the Office Action, at pages 5-6, claims 1-2 and 5-6 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Examiner submitted that the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors at the time the application was filed, had possession of the claimed invention and that Applicants were not in possession of the genus of "means for detecting the PprA protein or a fragment thereof." This rejection is traversed and reconsideration is requested (see below).

Claims 2, 6, 9, 11-13 and 15-16 have been canceled without prejudice or disclaimer.

With respect to **A**, **B**, and **C** above, independent claims 1 and 5 have been amended for clarity. The applicants have amended "a PprA protein derived from Deinococcus radiodurans or the fragment thereof" in claims 1 and 5 to recite "a PprA protein derived from Deinococcus radiodurans (SEQ ID NO: 1)". This amendment combines original claim 2 with claim 1 and combines original claim 6 with claim 5, respectively. Claims 2 and 6 have been cancelled without prejudice or disclaimer. By this amendment, it is clearly described that the PprA protein used in the invention of claims 1 and 5 consists simply of the protein having an amino acid sequence of SEQ ID NO: 1. The amendments are supported by line 23, page 5 through line 14, page 10 of the specification.

Further, the applicants also have added the terminology "using an antibody or a fragment thereof which specifically binds to the PprA protein" to claim 1. This amendment is to combine the original claim 9 with claim 1. Claim 9 has been canceled without prejudice or disclaimer.

Moreover, the applicants also have amended the terminology "a means for detecting the PprA protein or a fragment thereof" to recite "an antibody or a fragment thereof which specifically binds to the PprA protein". This amendment is to combine the original claim 13 with claim 5. Claim 13 has been canceled without prejudice or disclaimer.

Further, in accordance with cancellation of claims 2 and 6, claims 11, 12, 15 and 16, which directly or indirectly depend on claims 2 or 6, are also canceled without prejudice or disclaimer.

Hence, it is respectfully submitted that amended independent claims 1 and 5 contain subject matter which was described in the specification in such a way as to reasonably convey to one skilled in the relevant that the inventors, at the time the application was filed, had possession of the claimed invention, that applicants were in possession of the PprA proteins, and of active fragments thereof, that would bind to a DNA strand break, and that amended independent claims 1 and 5 comply with the written description requirement under 35 U.S.C. §112, first paragraph. Since claims 10 and 14 depend from amended independent claims 1 and 5, respectively, claims 10 and 14 are submitted to comply with the written description requirement under 35 U.S.C. §112, first paragraph, for at least the reasons amended independent claims 1 and 5 comply with the written description requirement under 35 U.S.C. §112, first paragraph.

Also, it is respectfully submitted that the specification provides enablement under 35 U.S.C. §112, first paragraph, for the case in which the PprA protein is one having SEQ ID NO: 1 (see line 23, page 5 through line 14, page 10 of the specification), and that the specification enables any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the method or make the kit of the invention commensurate in scope with these claims.

The terminology "means for" has been canceled in amended claim 5. Claim 5 has been amended to recite more clearly: "A kit for detecting *in situ* a DNA strand break, comprising: an amount of PprA protein derived from Deinococcus radiodurans (SEQ ID NO: 1) and an antibody or a fragment thereof which specifically binds to the PprA protein. Claim 1 has been amended in similar fashion. Claims 13 and 15 have been canceled without prejudice or disclaimer. It is respectfully submitted that applicants were in possession of antibody or a fragment thereof which specifically bind to the PprA protein at the time the application was filed (see line 23, page 5 through line 14, page 10 of the specification). Hence, amended independent claims 1 and 5 are submitted to comply with the written description requirement under 35 U.S.C. §112, first paragraph, and to contain subject matter which was described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Since claims 10 and 14 depend from amended independent claims 1 and 5, respectively, claims 10 and 14 are submitted to comply with the written description requirement under 35 U.S.C. §112, first paragraph, and to contain subject matter which was described in the specification in such a

way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention for at least the reasons that amended independent claims 1 and 5 comply with the written description requirement under 35 U.S.C. §112, first paragraph, and contain subject matter which was described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

REJECTION UNDER 35 U.S.C. §102:

In the Office Action, at pages 6-7, claims 5-6 and 13-16 were rejected under 35 U.S.C. §102(a) or (e) as being anticipated by Narumi et al. (JP 2003-052376 or US 2003-0143707 A1; since, as noted by the Examiner, the JP and US documents are equivalent in disclosure, both will be collectively referred to hereafter as "Narumi"). This rejection is traversed and reconsideration is requested.

Claims 6, 13 and 15-16 have been canceled without prejudice or disclaimer.

It is respectfully submitted that some of the inventors of the present invention and of JP 2003-052376 are the same, and the present invention is an improvement invention of JP 2003-052376.

An English translation with Translator's Certification of the foreign priority document for the present application JP 2003-026303 has been ordered, and will be forwarded to the USPTO as soon as possible. A certified copy of the foreign priority document was previously filed on February 10, 2004.

As an initial point of clarificatrion, JP 2003-052376 was first published on February 25, 2003, whereas the priority document JP 2003-026303 under 35 USC §119 for the present application, which was filed in Japan on February 3, 2003, it is respectfully submitted that JP 2003-052376 does not qualify as prior art under 35 U.S.C. §102(a) as it was not "described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent." Therefore, it is respectfully requested that the Examiner reconsider and withdraw the rejection of claims 5-6 and 13-16 in view of JP 2003-052376 under 35 U.S.C. §102(a).

Moreover, JP 2003-052376 describes a kit containing the PprA protein and an antibody thereto in para. [0055]. However, JP 2003-052376 does not describe direct measurement of the in vivo distribution of DNA damage in the cell or of the frequency of generation of DNA strand break(s) within the intracellular organelles (such as mitochondria).

On the other hand, the present invention is directed to a kit for directly measuring the in *vivo* distribution of DNA damage in the cell or of the frequency of generation of DNA strand break(s) within the intracellular organelles (such as mitochondria) in situ.

Therefore, the present invention is different from JP 2003-052376 in that the present invention can detect a DNA strand break in situ. Hence, claims 5 and 14 are not anticipated under 35 U.S.C. §102 (e) by JP 2003-052376.

REJECTION UNDER 35 U.S.C. §103:

In the Office Action, at page 7, claims 1-2 and 9-12 were rejected under 35 U.S.C. §103(a) as being unpatentable over Namuri et al. (JP 2003-052376) in view of Chaubron et al. (USPN 6,309,838; hereafter, Chaubron). The reasons for the rejection are set forth in the Office Action and therefore not repeated. The rejection is traversed and reconsideration is requested.

Claims 2, 6, 9, 11-13 and 15-16 have been canceled without prejudice or disclaimer.

Although the examiner states in the office action that Chaubron shows the steps that one can use in the case in which one uses a DNA binding protein (ligand) that recognizes DNA damage, including strand breaks, and also uses an antibody to detect the protein (ligand) bound to damaged DNA, it is respectfully submitted however, that, the problem to be solved by the invention of Chaubron is to provide a method for detecting a DNA strand break which is located on the purified DNA which is mutated by mutagens or on the DNA which is extracted from cells treated with mutagens.

In order to solve the problem, Chaubron uses "a cell extract which is purified to a greater or lesser degree with respect to the presence of a ligand which is endogenous and of DNA which is endogenous to said recognition medium" to recognize the DNA damage (see, column 10, lines 8-11 and Examples 1-5). However, the damaged DNA within each cell cannot be recognized by a cell extract in situ due to the presence of the endogenous proteins included in the cell extract which have an inhibitory effect on the binding of "the ligand" to the damaged DNA. Therefore, the method of Chaubron can only be applicable to a purified DNA or a DNA extracted from a cell.

In contrast, as described above, the present invention is directed to a method for directly measuring the in vivo distribution of DNA strand break in the cell or of the frequency of generation of DNA strand break(s) within the intracellular organelles (such as mitochondria) in situ. That is to say, in the present invention, DNA strand breaks can be detected within each cell (in situ) without extracting the cellular DNA.

The method of the present invention is characterized by the use of a purified PprA protein derived from Deinococcus radiodurans rather than a cell extract prepared from various types of cells. Since a purified PprA protein derived from Deinococcus

radiodurans does not include any endogenous proteins which inhibit the binding of the PprA protein to the damaged DNA, the DNA strand breaks are effectively detected within mammalian cells in situ without the detection being inhibited by the endogenous protein included in the cell extract.

Further, the present invention demonstrates an unexpected advantageous effect over the prior art that the present invention distinguishes the DNA strand break generated in the nucleus of each cells from the DNA strand break generated in the mitochondria, since the present invention can directly measure the in vivo distribution of DNA strand break within the cell or of the frequency of generation of DNA strand breaks) within the intracellular organelles (such as mitochondria) in situ.

Since the present invention exerts an advantageous effect over the invention of Narumi et al. (JP 2003-052376) in view of the invention of Chaubron, as described above, it is respectfully submitted that amended independent claim 1 is unobvious for those ordinarily skilled in the art to use the PprA protein in any detection method taught by Chaubron, and therefore is patentable under 35 U.S.C. §103(a) over Namuri et al. (JP 2003-052376) in view of Chaubron et al. (USPN 6,309,838). Since claim 10 depends from amended independent claim 1, claim 10 is patentable under 35 U.S.C. §103(a) over Namuri et al. (JP 2003-052376) in view of Chaubron et al. (USPN 6,309,838) for at least the reasons amended independent claim 1 is patentable under 35 U.S.C. §103(a) over Namuri et al. (JP 2003-052376) in view of Chaubron et al. (USPN 6,309,838).

CONCLUSION:

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot, and further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any underpayments or overpayments of fees associated with the filing of this Amendment, please charge and/or credit the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: November 27, 2006 By: Darleen J. Stockley

Darleen J. Stockley
Registration No. 34,257

1201 New York Avenue, N.W.
Suite 700
Washington, D.C. 20005
Telephone: (202) 434-1500
Facsimile: (202) 434-1501